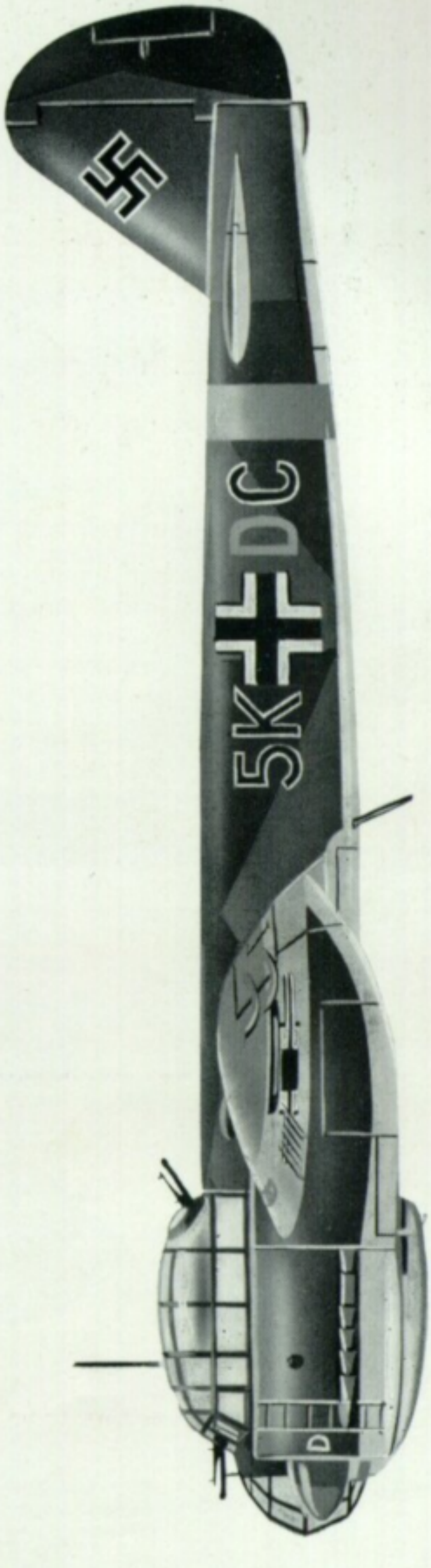
PROFILE PUBLICATIONS

The Junkers Ju 88A

NUMBER 29



The Junkers Ju 88A

by Martin C. Windrow

Junkers Ju 88As of 8/KG 1 "Hindenburg" run up their engines on a Russian airstrip.
(Photo: R. Ward Collection)

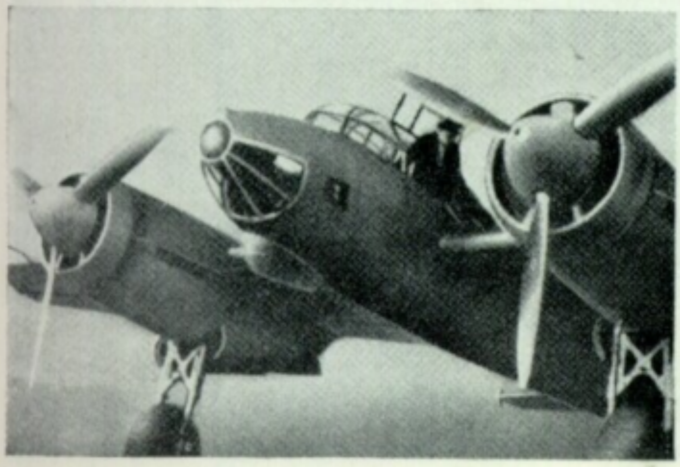
When on 21st December 1936 the first prototype Junkers Ju 88 lifted off the runway on its maiden flight, the watching officials of the *Junkers Flugzeug und Motorenwerke* could not know that they were watching the birth of an aircraft which was to become unique in the history of air warfare. They knew that they had produced a sleek, fast medium bomber which showed great promise—on paper. They had no way of foreseeing that by the time production of the Ju 88 series ceased in the spring of 1945 their "medium bomber" would have proved itself to be the nearest thing to a literally all-purpose aeroplane ever built. Flying and fighting on all fronts to which German forces were committed during the Second World War, the Ju 88 was to appear as a day fighter, night fighter, dive bomber, level bomber, torpedo bomber, minelayer, reconnaissance aircraft, communications aircraft, close-support aircraft and flying bomb; and would fulfil many other specialised tasks, at home and in the field, whenever an aircraft of flexible performance was required. It was to be the most modifiable aircraft the world had known, and would prove itself the best by far of the rather indifferent selection of bombers which the *Luftwaffe* would operate during the war.

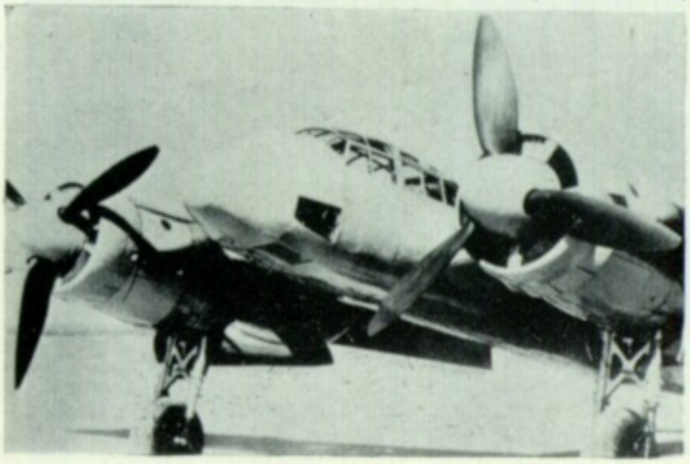
The requirement for a fast medium bomber to equip the *Luftwaffe*'s new *Kampfgeschwader* was announced to representatives of the German aircraft industry by *General-luftzeugmeister* Erhard Milch at an R.L.M. meeting held in the spring of 1935. Three designs were submitted in response by the firms of Messerschmitt, Focke-Wulf and Junkers. Messerschmitt's Bf 162 was eliminated when it was announced on a policy level that the company should in future concentrate solely upon fighter production. The Focke-Wulf Fw 57 project was abandoned following the loss of the first prototype; serious inconsistencies between the calculated and the actual weights had come to light. The Ju 88 thus won the competition by default of its rivals, but this implies no lack of positive merits.

The machine had been designed by W. H. Evers and the American Al Gassner, who was working in Europe during 1935-36. The period between the commencement of design work on 15th January 1936 and the maiden flight on 21st December of the same year was sensationally short by existing standards. The first prototype, the Ju 88V1, featured a low-silhouette streamlined canopy and was powered by DB 600 engines rated at 900 h.p. It was destroyed after only a part of the flight test programme had been completed. The Ju 88V2, which appeared in April 1937, achieved a speed of 289 m.p.h. and a range of over 1,200 miles.

It was in the Ju 88V3 and V4 that the features characteristic of later operational machines first

Left: *The third prototype, Ju 88V3, powered by Jumo 211A engines.* Right: *The Ju 88V5 "publicity prototype".*
(Photos: G. Heumann/Air Pictorial)





appeared. The V3 was powered by two twelve-cylinder liquid-cooled Junkers Jumo 211A engines. Rated at 950 h.p. and 1,000 h.p. at take-off and at 17,000 feet respectively, the 211A had direct fuel injection (a field in which German industry led the world), two stage supercharging, and the segmented radiators and circular cowlings which gave the Ju 88 the appearance of being a radial-engined aircraft.

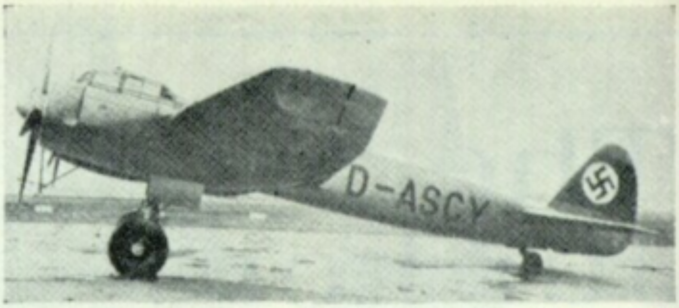
With the V4, crew accommodation was raised to four and the characteristic nose of the Ju 88A series appeared for the first time. The tapered noses of the V1, V2 and V3 were replaced in this fourth prototype by a blunt, fully glazed unit with many braces. This nose was not "blown" but built up of twenty optically-flat glass panels arranged in a bulged "beetle's eye". Another important innovation was the ventral gondola offset under the starboard forward fuselage, to accommodate a prone gunner manning a rear-firing 7·9 mm. MG 15 machine gun. This addition had been foreshadowed by the small cupola which was fitted under the nose of the V3. The length of the V4 was, at 47 ft. 1 in., 1 ft. 8 in. greater than the preceding machines; the loaded weight was increased to 22,040 lb.

The Ju 88V5 was subjected to a rigorous "cleaning-up" programme, reverting to a tapered, unglazed nose unit. It was thought expedient that the Reich's new *schnellbomber* should be unveiled to the world in a suitably prestigious light, and the fifth prototype, powered by Jumo 211B-1 engines of 1,200 h.p., was adapted for record attempts. These efforts were handsomely rewarded when the V5 set up a record average speed of 321·25 m.p.h. over a closed circuit of 1,000 km. (621·3 miles) while carrying a 2,000 kg. (4,409 lb.) load. This record was established by Heintz and Siebert in March 1939; and in July of the same year the V5 achieved an average speed of 311 m.p.h. over 2,000 km. (1,242·7 miles) with the same payload.

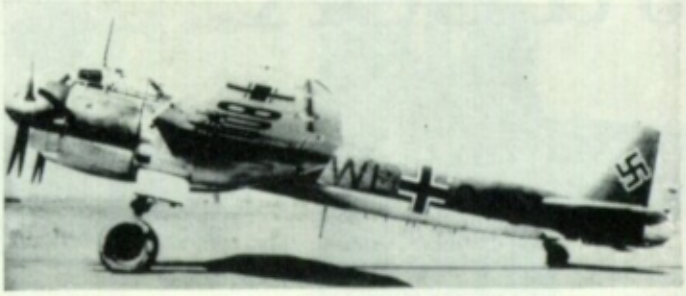
PRODUCTION BEGINS

Quantity production of the Ju 88A was planned late in 1937 and plants began tooling up early in 1938. These tools and jigs were mainly produced at Junkers' Schoenebeck plant; wings, fuselage, and tail units were constructed at Halberstadt, Aschersleben and Leopoldshall respectively, and final assembly lines and flight testing facilities were laid out at Bernburg. Henschel, Heinkel, Dornier, Arado and Volkswagen plants were all awarded contracts for the production of aircraft or component units.

Nose emblem of a Junkers Ju 88A-1 of I/KG 30 "Adler Geschwader". Note centre-hinged "quarter-light".
(Photo: Imperial War Museum)



Production prototype for the A series was the Ju 88V6, D-ASCY. (Photo: G. Heumann/Air Pictorial)

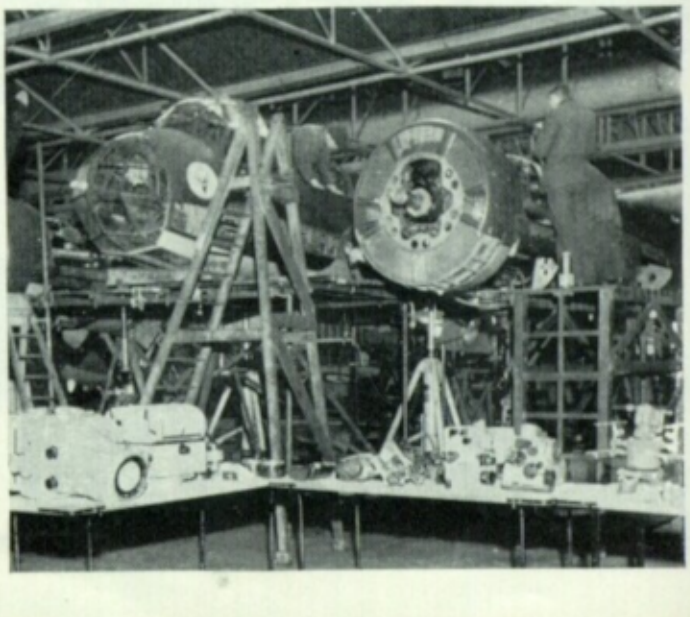


The eighth of ten pre-production Ju 88A-O machines. Aircraft of this batch were used by Kampfgeschwader 25 in the early weeks of W.W.II.

The production prototype for the A series was the V6 (D-ASCY). Powered by Jumo 211 B-1s, the V6 was capable of 301 m.p.h. at a loaded weight of 22,590 lb., with a range of 1,522 miles and a service ceiling of 22,300 ft. The main undercarriage was redesigned and featured single hydraulic legs which retracted backwards into the nacelles, the wheels turning through a 90° arc to lie flat on the same plane as the wings.

The initial batch of ten pre-production Ju 88A-O machines were completed for service trials by *Erprobungskommando 88* in the spring of 1939. In accordance with the current German preference for aircraft with dive-bombing capabilities, slatted dive-brakes were hinged under the front spar outboard of the nacelles. The production Ju 88A-1, of which some sixty examples had been delivered by the close of 1939,

A machine of 4th Staffel, Long-Range Reconnaissance Gruppe 121 "on the bench". (Photo: Imperial War Museum)



also carried these brakes and was strictly limited in the scope of high-speed manœuvres permitted; the fuselage was already highly stressed and the operation of the brakes during maximum power flight involved a distinct danger of structural failure.

The A-1 was powered by Jumo 211B-1s and mounted a defensive armament of (initially) three 7·9 mm. machine guns; one in a fixed mounting on the starborad side of the canopy front, one slightly offset to port in the rear of the canopy and one in the ventral gondola. Experience in the Battle of Britain proved that this was an inadequate defensive battery and some machines were fitted with a second gun in the rear of the canopy. Normal warload was 3,968 lb.–5,510 lb., the bulk of which was carried on four external pylons. The pylons were installed, in pairs, under each wing between the fuselage and the nacelle. The four crew members were positioned close together in the nose; the pilot in a raised seat to port, the bombardier/air gunner to the pilot's right, and below him in the body of the fuselage; the engineer/air gunner occupied a prone position in the ventral gondola, facing to the rear. The wireless operator/air gunner sat behind the pilot facing to the rear. In four-gun aircraft the ventral gunner doubled as a second upper rear gunner.

DEVELOPMENT OF THE JU 88A SERIES

Further development of the Ju 88A series can be traced through the following variants:

Ju 88A-2 Bomber. *Engines:* 2×Jumo 211B-1 of 1,200 h.p. each. *Armament:* 4×7·9 mm. MG 15. *Bomb Load:* 3,968 lb. *Span:* 59 ft. 10¾ in. *Length:* 47 ft. 1 in. *Loaded Weight:* 25,353 lb. *Ceiling:* 22,300 ft. *Max. Speed:* 286 m.p.h. *Range:* 1,553 miles.

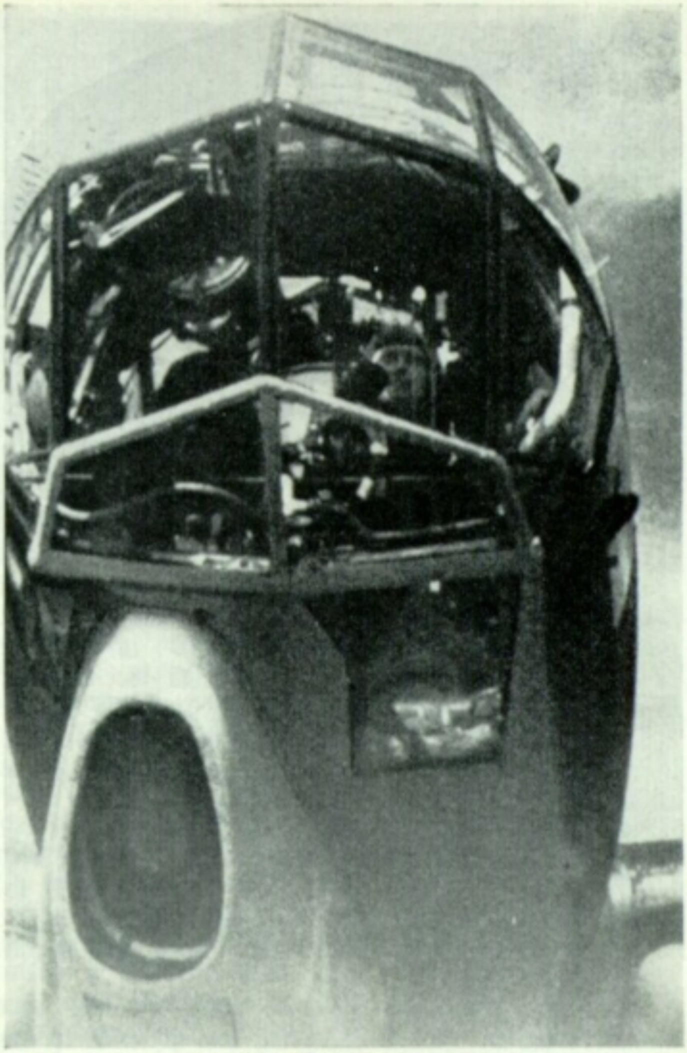
This variant was similar to the A-1 but carried assisted take-off equipment.

Ju 88A-3 Trainer. *Engines:* 2×Jumo 211B-1 of 1,200 h.p. each. *Armament:* 4×7·9 mm. MG 15. *Bomb Load:* None. *Span:* 59 ft. 10¾ in. *Length:* 47 ft. 1 in. *Loaded Weight:* 22,200 lb. *Ceiling:* 22,300 ft. *Max. Speed:* 286 m.p.h. *Range:* 1,553 miles.

The A-3 was a conversion training variant of the A-1 with dual controls and duplicated instrumentation.

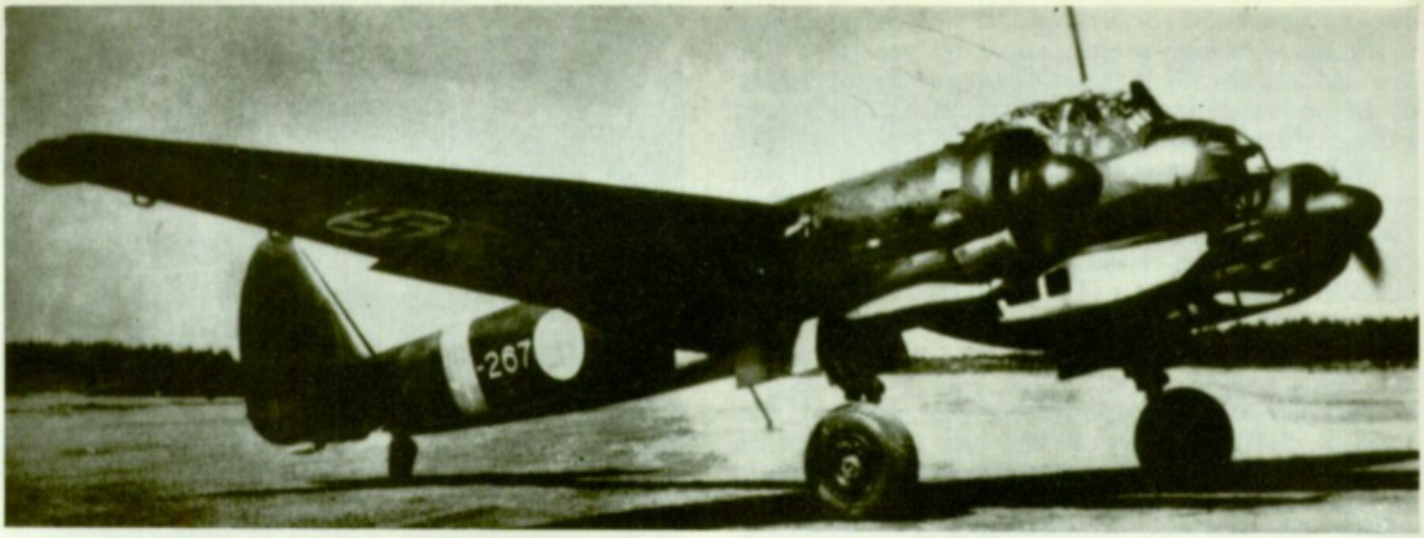
Ju 88A-4 Bomber. *Engines:* 2×Jumo 211B-1 of 1,200 h.p. each. *Armament:* 2×13 mm. MG 131; 3/4×7·9 mm. MG 81. *Bomb Load:* 5,510 lb. *Span:* 65 ft. 10½ in. *Length:* 47 ft. 1½ in. *Loaded Weight:* 26,700 lb. *Ceiling:* 27,880 ft. *Max. Speed:* 293 m.p.h. *Range:* 1,900 miles.

The Ju 88A-4 was the most important variant of the series. Entering production late in 1940, it embodied modifications which the shortcomings of the A-1 during the first year of the war had shown to be essential. The wing span was increased by six feet, the undercarriage strengthened and considerable armour protection installed around the crew positions. The exact armament pattern varied, but usually consisted of one MG 131 and one MG 81 firing forward, one single or twin MG 81 firing aft from the ventral gondola, and two MG 81 or one MG 131 firing aft from the rear of the canopy. All gun mountings were armoured. The bomb load could be raised by A.T.O. measures to 6,614 lb., the underwing carriers accommodating various combinations of 550-lb., 1,100-lb., and 2,200-lb. bombs. The A-4/Trop was a tropicalised variant with suitable additions to the internal equipment but no structural changes.



Detail of "beetle's eye" nose panels.

Luftwaffe gunners in position at early-style double rear gun mountings. In later models armour-glass "lenses" were fitted on either side of the cockpit rear. (Photos: R. Ward Collection)



Ju 88A-4/R, as supplied to the Finnish Air Force.

Ju 88A-4/R Bomber. *Engines:* 2×Jumo 211J of 1,410 h.p. each. *Armament:* 5×7·9 mm. MG 81. *Bomb Load:* 6,614 lb. *Span:* 65 ft. 10½ in. *Length:* 47 ft. 1½ in. *Loaded Weight:* 31,000 lb. *Ceiling:* 27,880 ft. *Max. Speed:* 273 m.p.h. *Range:* 1,553 miles.

Twenty examples of the A-4/R variant were supplied to the Finnish Air Force for operations against Soviet forces.

Ju 88A-5 Bomber. *Engines:* 2×Jumo 211B-1 (or 211D) of 1,200 h.p. each. *Armament:* 2×13 mm. MG 131; 3×7·9 mm. MG 15. *Bomb Load:* 4,410 lb. *Span:* 65 ft. 10½ in. *Length:* 47 ft. 1½ in. *Loaded Weight:* 27,557 lb. *Ceiling:* 27,880 ft. *Max. Speed:* 280 m.p.h. *Range:* 1,398 miles.

Illogically, the A-5 variant preceded the A-4 into production by a few months late in 1940. It was basically an A-1 with the increased span and bomb load capacity, but lacked many of the other refinements which were built into the A-4. Balloon cable cutters could be fitted to the wing leading edges.

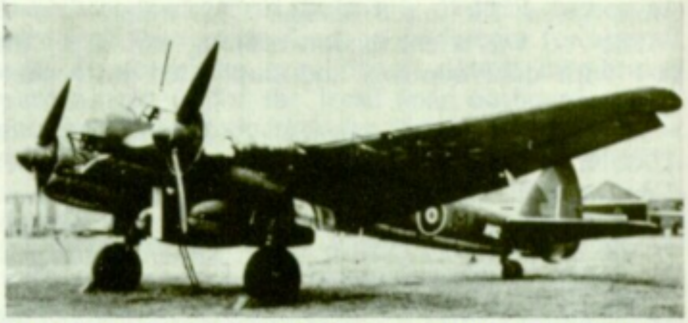
Ju 88A-6 Balloon destroyer. *Engines:* 2×Jumo 211G of 1,200 h.p. each. *Armament:* 4×7·9 mm. MG 15. *Bomb Load:* None. *Span:* 65 ft. 10½ in. *Length:* 47 ft. 1½ in. *Loaded Weight:* app. 27,900 lb. *Ceiling:* 23,620 ft. *Max. Speed:* 261 m.p.h. *Range:* 1,553 miles.

Basically similar to the A-5, the A-6 carried a balloon cable fender/cutter framework. This equipment, which extended as an angular frame from wingtip to wingtip along the leading edges and round the nose, was very unwieldy and made necessary the addition of a 130 lb. trimming weight in the tail section. The A-6 saw only limited service. (For a photograph of the fender gear as installed on the A-6, see page 6 of *Profile* No. 15, *The Heinkel He 111H.*)

Ju 88A-6/U Long-range reconnaissance aircraft. *Engines:* 2×Jumo 211H of 1,200 h.p. each. *Armament:* 3×7·9 mm. MG 81. *Bomb Load:* None. *Span:* 65 ft. 10½ in. *Length:* 47 ft. 1½ in. *Loaded Weight:* 24,250 lb. *Ceiling:* 23,620 ft. *Max. Speed:* 295 m.p.h. *Range:* 1,864 miles.

The A-6/U carried a three-man crew only. The ventral gondola was omitted and search radar equipment carried.

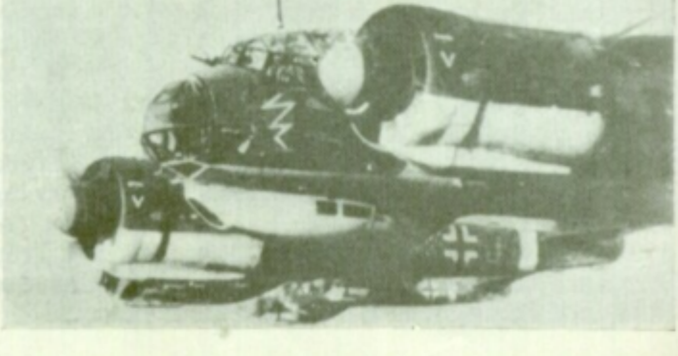
Ju 88A-7 Trainer. *Engines:* 2×Jumo 211B-1 of 1,200 h.p. each. *Armament:* 3/4×7·9 mm. MG 15. *Bomb Load:* None. *Span:* 65 ft. 10½ in. *Length:* 47 ft.



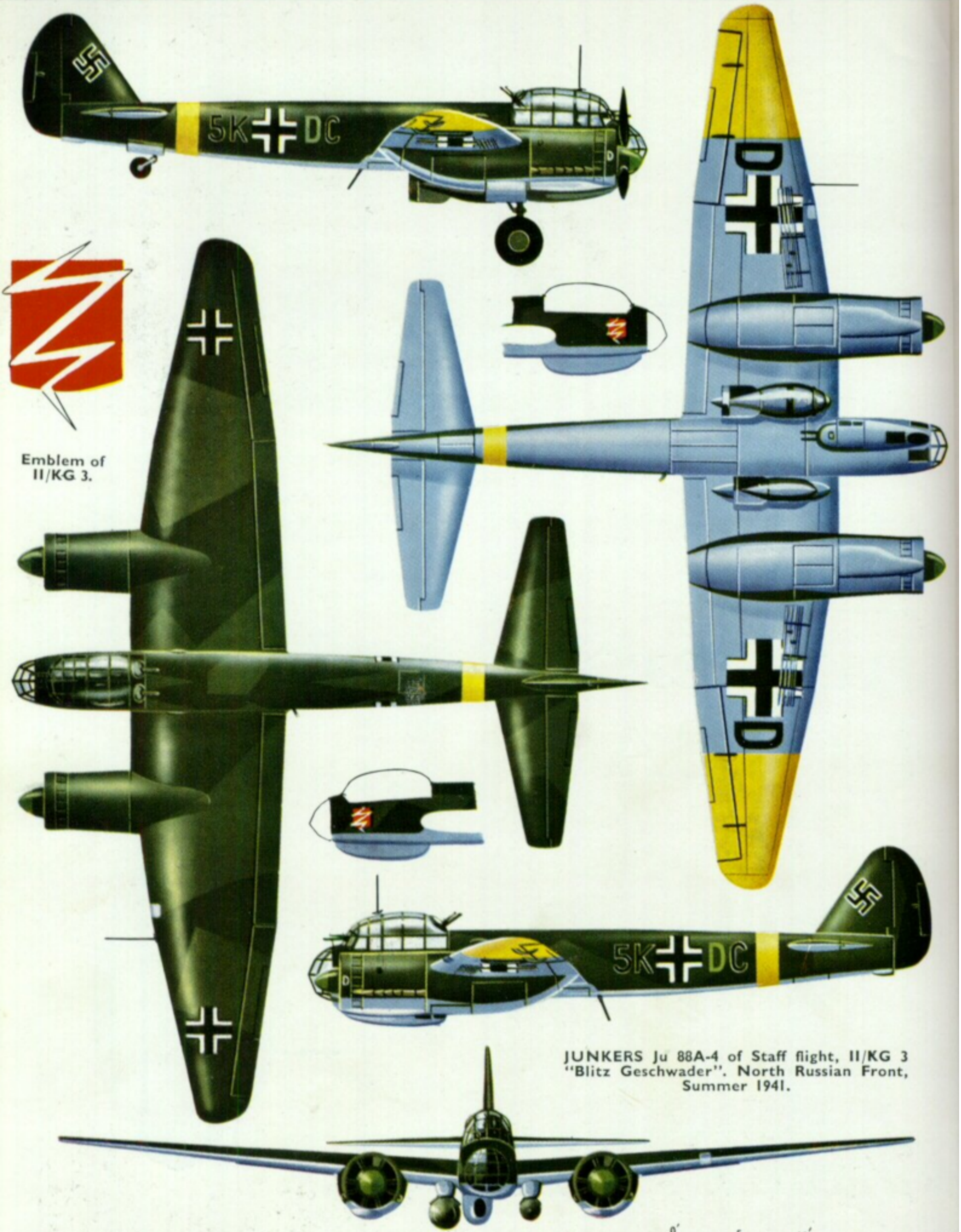
Left: *Luftwaffe aircrew await the order to "mount" their Ju-88A-4.* Right: *This captured Ju 88A-6U reconnaissance aircraft displays search radar antennae on the wing leading edge. The ventral gondola has been omitted and long-range fuel tanks are fitted under the wing roots.*

Undercarriage damage sustained by a Ju 88A on a Mediterranean airfield. Note access ladder.

Ju 88A-4s of 5/KG 3 "Blitz Geschwader" in tight formation; this Wing operated on the Russian Front throughout the campaign.



Emblem of II/KG 3.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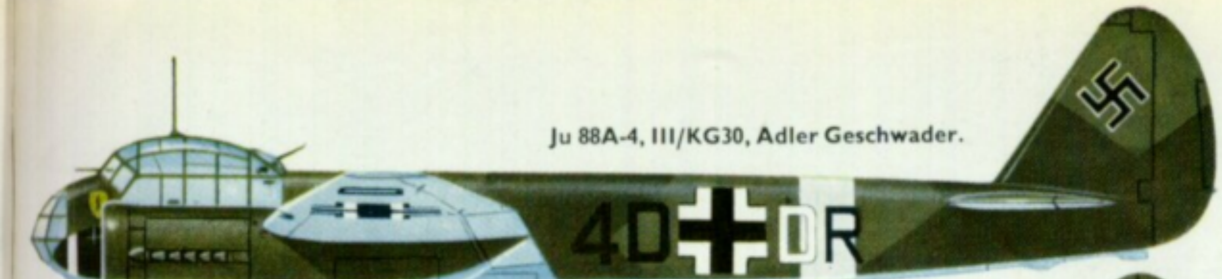
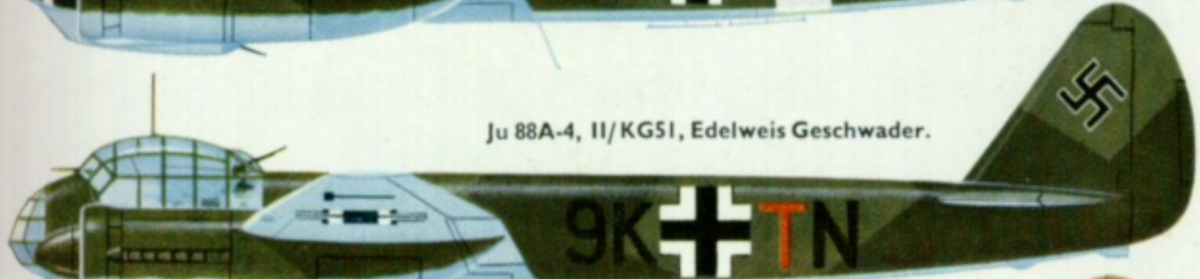
JUNKERS Ju 88A-4 of Staff flight, II/KG 3 "Blitz Geschwader". North Russian Front, Summer 1941.

© JAMES GOULDING

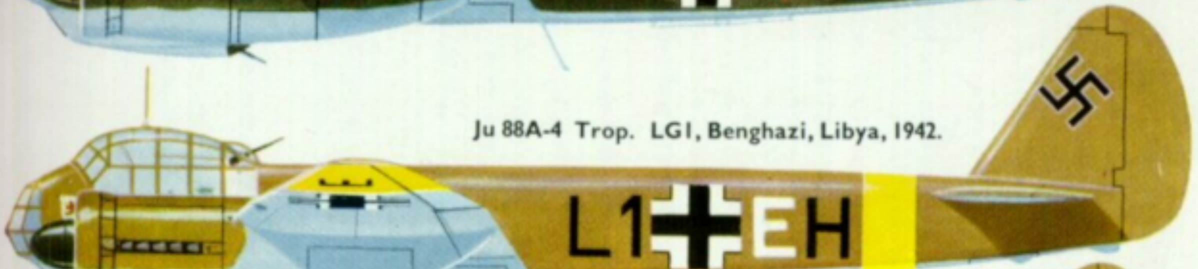
Ju 88A-4, III/KG30, Adler Geschwader.



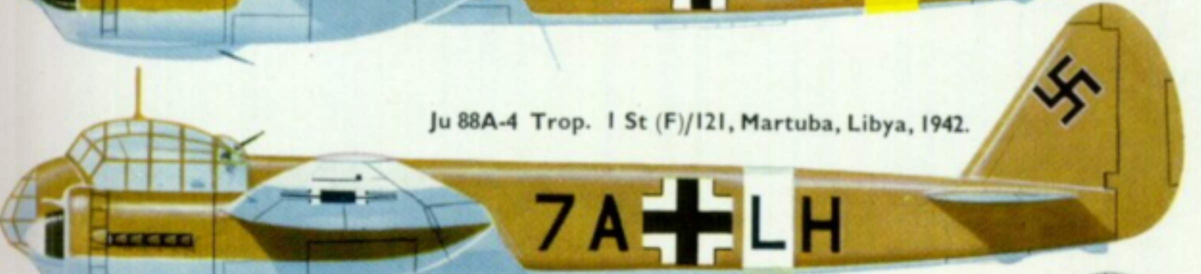
Ju 88A-4, II/KG51, Edelweis Geschwader.



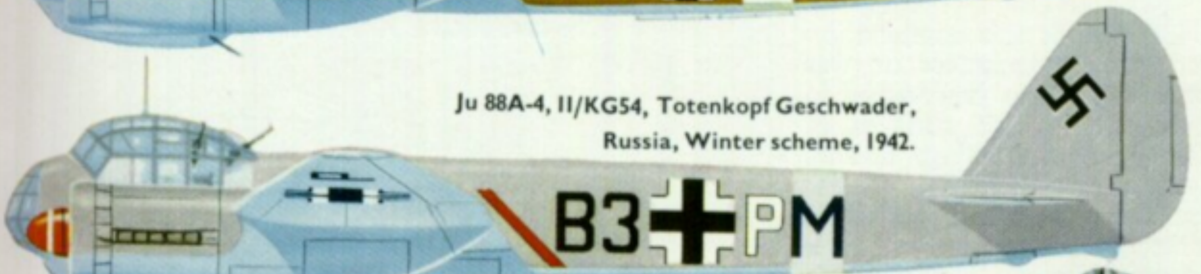
Ju 88A-4 Trop. LG1, Benghazi, Libya, 1942.



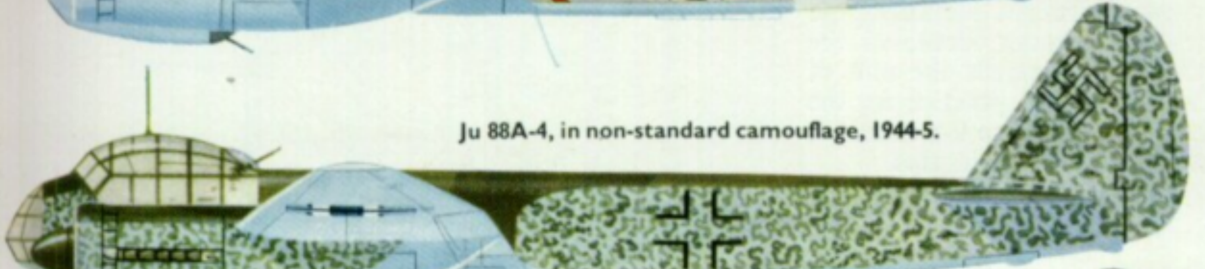
Ju 88A-4 Trop. 1 St (F)/121, Martuba, Libya, 1942.



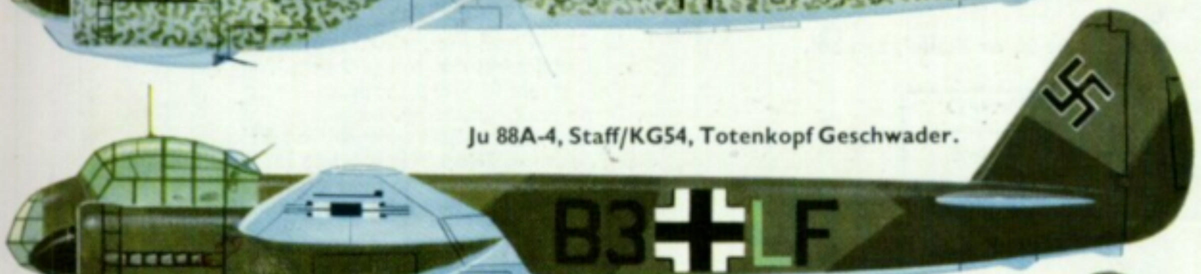
Ju 88A-4, II/KG54, Totenkopf Geschwader,
Russia, Winter scheme, 1942.



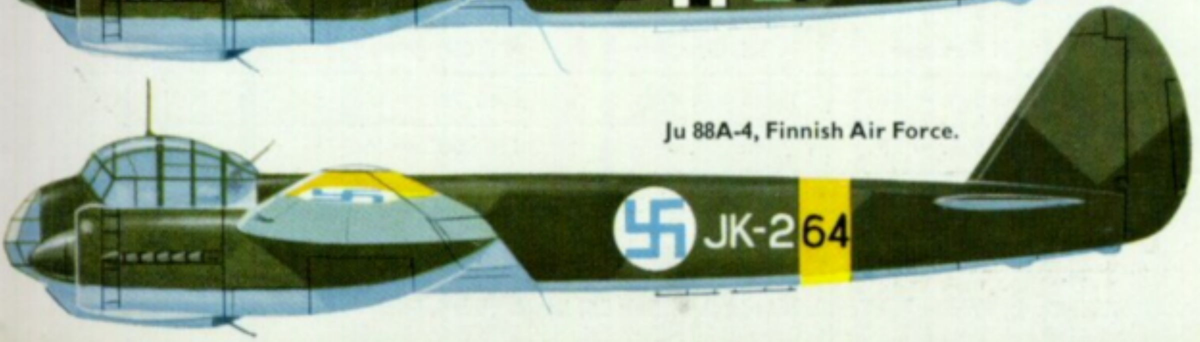
Ju 88A-4, in non-standard camouflage, 1944-5.

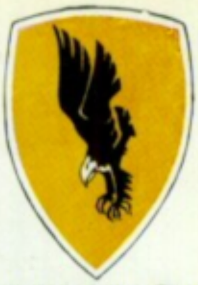


Ju 88A-4, Staff/KG54, Totenkopf Geschwader.

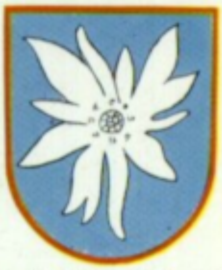


Ju 88A-4, Finnish Air Force.

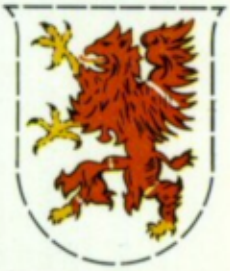




III/KG30, Adler Geschw



KG51, Edelweis Geschw.



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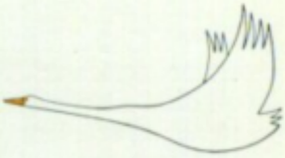

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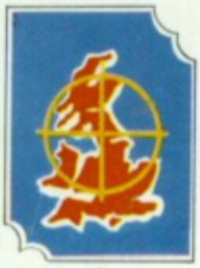

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II/KG54

KG54 Totenkopf Geschw.

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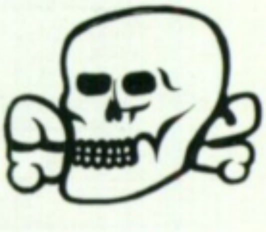

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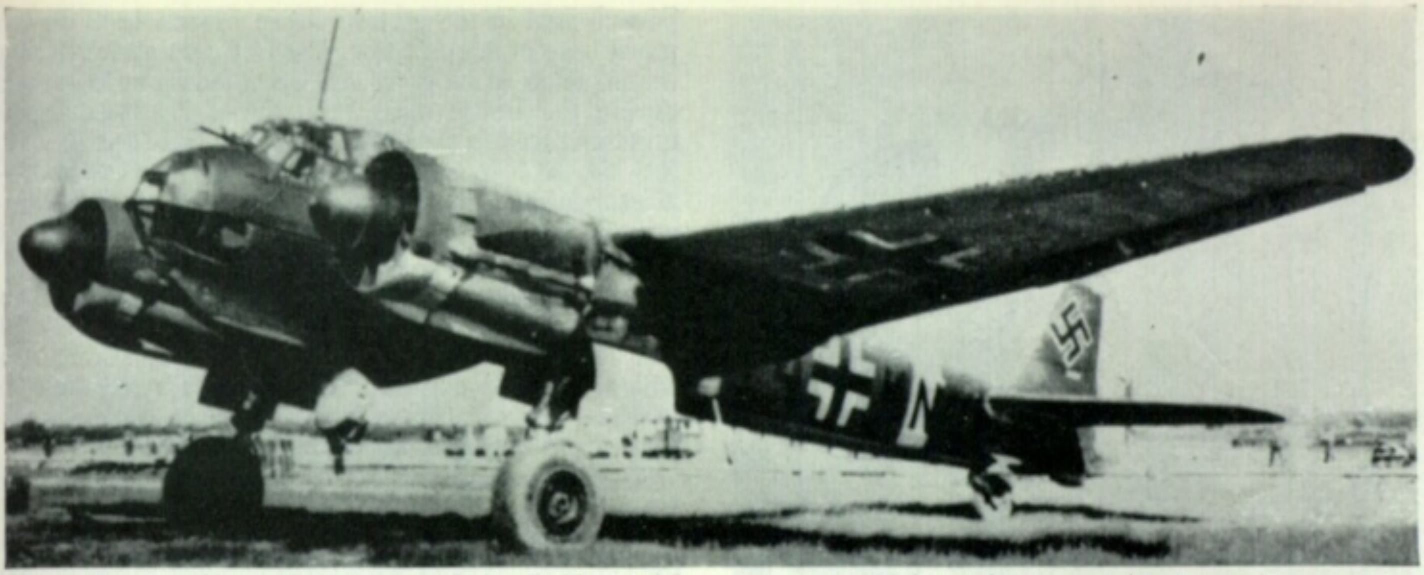


V 4 + K N, a Ju 88A-4 of 5/KG 1 "Hindenburg". The gondola, carrying twin MG 81 machine guns, is hanging open.
(Photo: Imperial War Museum)

1½ in. *Loaded Weight:* Unknown. *Ceiling:* 23,620 ft. *Max. Speed:* 295 m.p.h. *Range:* 1,550 miles.

A dual control training variant modified from early production A-4 airframes.

Ju 88A-8 Balloon destroyer. This version differed from the A-6 in being constructed around an A-4 airframe.

Ju 88A-9 Bomber. An alternative designation for tropicalised A-1 airframes.

Ju 88A-10 Bomber. An alternative designation for tropicalised A-5 airframes.

Ju 88A-11 Bomber. An alternative designation for tropicalised A-4 airframes.

Ju 88A-12 Trainer. *Engines:* 2×Jumo 211G of 1,200 h.p. each. *Armament:* None. *Bomb Load.* None. *Span:* 65 ft. 10½ in. *Length:* 47 ft. 1½ in. *Max. Speed:* 298 m.p.h. *Ceiling:* 23,620 ft.

A dual control trainer variant of the A-4 with ventral gondola removed and increased cockpit width.

Ju 88A-13 Close support aircraft. *Engines:* 2×Jumo 211H of 1,200 h.p. each. *Armament:* 10/16×7·9 mm. MG 17; 4×7·9 mm. MG 81. *Bomb Load:* 1,100 lb. *Span:* 65 ft. 10½ in. *Length:* 47 ft. 1½ in. *Loaded Weight:* 28,660 lb. *Ceiling:* 23,620 ft. *Max Speed:* 261 m.p.h. *Range:* Unknown.

The A-13 was a heavily armoured ground attack variant. Bomb load usually consisted of a *Schuettkaesten* container of 72 small anti-personnel bombs under each wing. Many examples of this variant were fitted with automatic pull-out devices as the type was not equipped with dive brakes.

Ju 88A-14 Maritime attack bomber. *Engines:* 2×Jumo 211J of 1,410 h.p. each. *Armament:* 2×7·9 mm. MG 15; 2×13 mm. MG 131. *Bomb Load:* 5,510 lb. *Span:* 65 ft. 10½ in. *Length:* 47 ft. 1½ in. *Loaded Weight:* 26,700 lb. *Ceiling:* 23,620 ft. *Max. Speed:* 273 m.p.h. *Range:* 1,550 miles.

The anti-shipping variant of the basic A-4 conception, the A-14 was fitted with electric balloon-cable cutters in the leading edges.

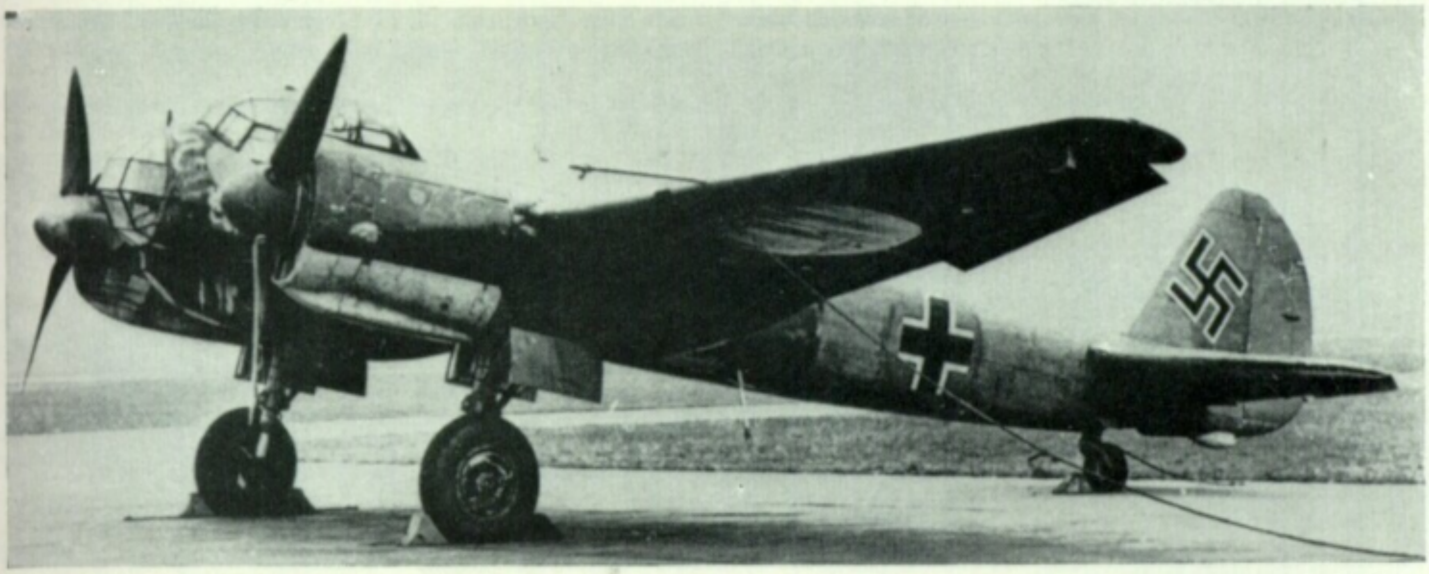
Ju 88A-15 Bomber. *Engines:* 2×Jumo 211G of 1,200 h.p. each. *Armament:* 2×7·9 mm. MG 15; 2×13 mm. MG 131. *Bomb Load:* 6,614 lb. *Span:* 65 ft. 10½ in. *Length:* 47 ft. 1½ in. *Loaded Weight:* 28,247 lb. *Ceiling:* 23,620 ft. *Max. Speed:* 280 m.p.h. *Range:* 1,550 miles.

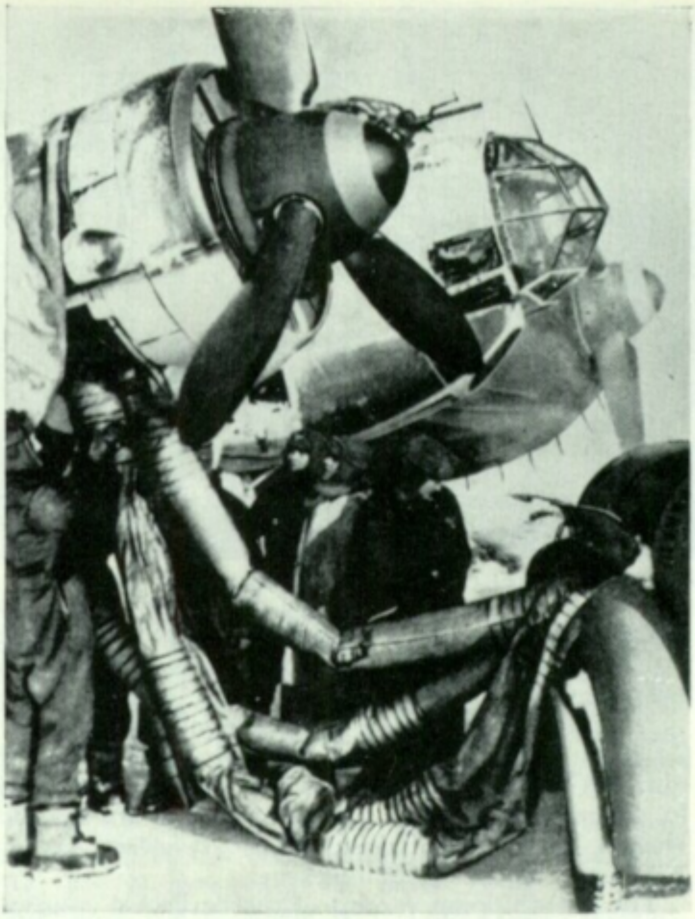
The A-15 variant was basically an A-4 airframe with a large bulged bomb bay. The 6,614-lb. bomb load was carried internally.

Ju 88A-16 Trainer. There was no essential difference between the A-12 and this improved version.

Ju 88A-17 Torpedo bomber. *Engines:* 2×Jumo 211J of 1,410 h.p. each. *Armament:* 3/5×7·9 mm. MG 81. *Bomb Load:* Max. 6,614 lb. Usually, 2×2,200 lb. torpedoes. *Span:* 65 ft. 10½ in. *Length:* 47 ft. 1½ in. *Loaded Weight:* 25,350 lb. *Ceiling:* 28,215 ft. *Max. Speed:* 295 m.p.h. *Range:* 1,860 miles.

The Ju 88A-13 carried a battery of up to 16 MG 17 machine guns for close support missions. Containers of 72 anti-personnel bombs were carried under the wings.
(Photo: Imperial War Museum)





Snow-camouflaged Ju 88A during a pre-flight "warm-up" in Russia. (Photo: R. Ward Collection)

A torpedo-carrying conversion of the A-4 airframe. The two outboard bomb pylons were discarded; the two inboard pylons replaced by torpedo shackles, and a small instrument pod faired to the lower starboard side of the nose giving access to the torpedo steering gyros for in-flight adjustment.

THE JU 88A IN SERVICE

Pre-production Ju 88A-Os and the initial batch of A-1s served briefly with I/KG 25 in the summer of 1939. The unit had been formed by simply re-naming *Erprobungskommando 88* in August of that year. In September I/KG 25 became the first *Gruppe* of KG 30 "*Adler Geschwader*", the first and most famous of all operational Ju 88 units. KG 30 was occupied in the early months of the war on anti-shipping strikes in the North Sea and round the east coast of Scotland, and participated in the major raid in March 1940 on the naval base of Scapa Flow. The unit was active during the invasion of Norway and operated from Denmark during the Battle of Britain. Other Ju 88-equipped units involved in that epic campaign included KG 51, KG 54, KG 76, KGr 806 and LG 1. In the reconnaissance rôle the Ju 88 served with *Aufklärungsgruppen* (F) 120, 121 and 123 on the establishment of *Luftflotte* III.

It would be impossible in a work of this size to give a complete breakdown of the Ju 88s unparalleled war service, but a brief summary of the main units which operated this aircraft follows. The symbols in brackets refer to unit codes; see paragraph on *Luftwaffe Units and Markings* below.

KG 1 "Hindenburg" (V4): The He 111Hs of III/KG 1 were replaced by Ju 88A-5s in the late summer of 1940. Complete re-equipment of I/KG 1, II/KG 1 and the *Geschwader* Staff with the Ju 88 was not achieved until October 1942. The unit was disbanded during the summer of 1944 after operations in Russia, Italy and the Middle East.

KG 2 "Holzhammer" (U5): This unit operated a single *Staffel* of Ju 88s on the Western Front for a short period.

KG 3 "Blitz" (5K): By June 1941 the *Geschwader* Staff, I/KG 3 and II/KG 3 had received the Ju 88A-5. The third *Gruppe* received the aircraft during operations in Russia, where the *Geschwader* operated throughout the war.

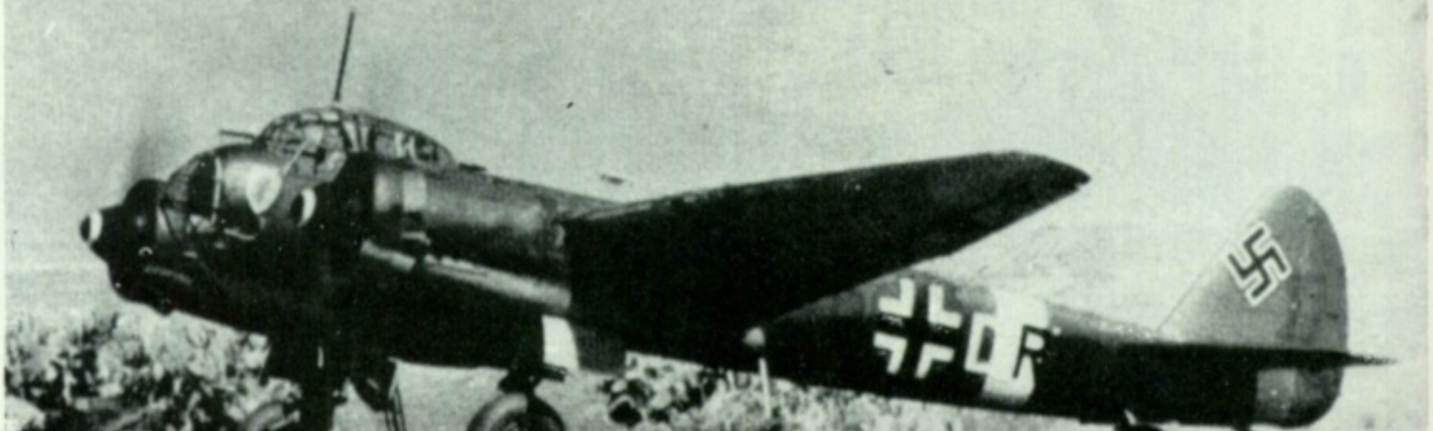
KG 4 "General Wever" (5J): The *Geschwader* Staff and III/KG 4 were equipped with the Ju 88 in the summer of 1940, but relinquished the aircraft for replacement by the He 111H before June 1941. It is unlikely that the unit ever used the Ju 88A on active service.

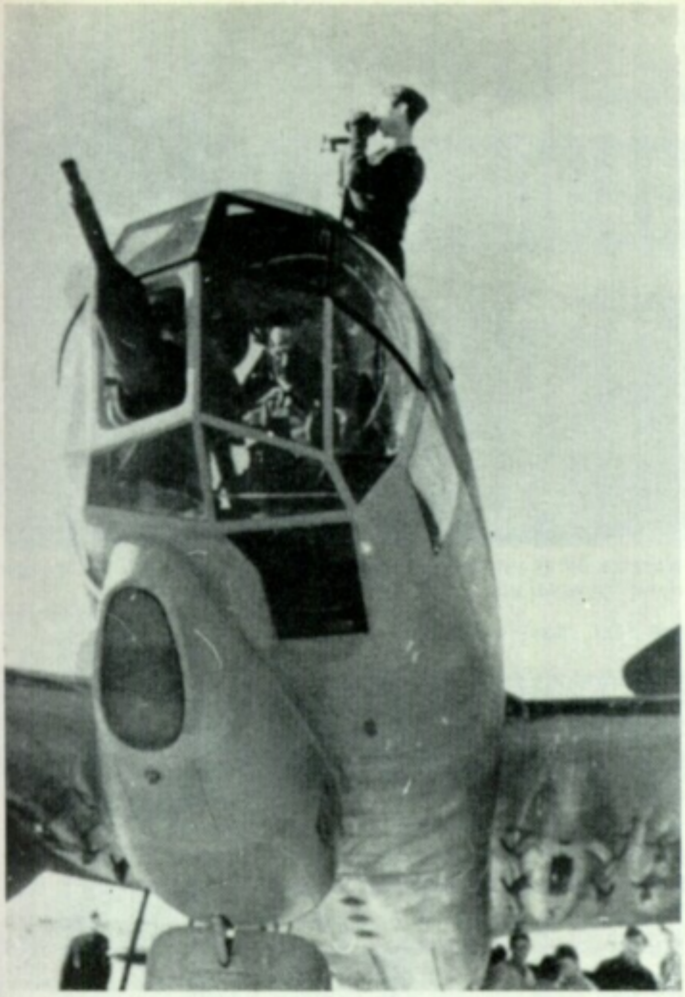
KG 6 (3E): Equipped with the Ju 88A for operations in the West upon its formation in May 1942. Saw limited service on all fronts, and relinquished the Ju 88 early in 1944.

KG 26 "Löwen Geschwader" (1H): III/KG 26 operated the Ju 88 briefly in July 1942. The A-14 variant was issued to the *Geschwader* in April/May 1944 for anti-shipping operations. The unit operated in Norway, the Baltic, and the Mediterranean theatre.

KG 30 "Adler Geschwader" (4D): As stated above, this unit was the first true *Kampfgeschwader* to receive the Ju 88A in 1939, and went on to operate the A-O, A-1, A-4, A-5 and later types in Scandinavia, the Balkans, Russia and Southern Europe throughout the

A Ju 88A of 7/KG 30 during that unit's service in the Balkans. (Photo: R. Ward Collection)





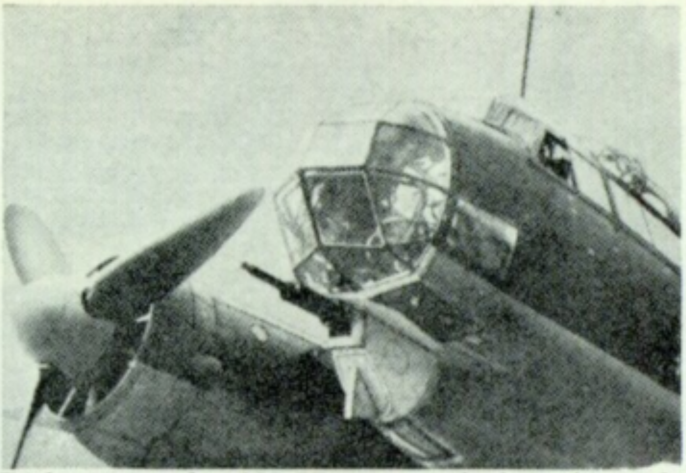
Non-standard Ju 88A-4, with 20 mm. cannon mounted in the nose "glass-house".

whole duration of the European war. In the final stages of the hostilities KG 30 was equipped with a few examples of *Mistel* flying bombs, consisting of converted Ju 88A-4s containing a 7,726-lb. hollow charge warhead guided and controlled by a single-engined fighter mounted on a framework above it.

KG 40 (F8): Upon its formation in July 1940 the Staff element of this *Geschwader* was issued with the Ju 88A-1. II/KG 40 exchanged its He 177As for Ju 88s in September 1943 for operations in Italy.

KG 51 "Edelweis" (9K): The second *Geschwader* to receive the Ju 88(A-5), KG 51 participated in the Battle of Britain and in the first two years' operations on the Russian Front. The Ju 88 was withdrawn from this unit over a period of months beginning in April 1943.

KG 54 "Totenkopf" (B6): Fully equipped with the Ju 88 by August 1940, the three *Gruppen* of the "Death's Head Wing" took part in the Battle of Britain. Operations in Russia in late 1941 were followed by service in the Mediterranean in the spring of 1942 and a limited participation in the night attacks on the United Kingdom during January 1944.



Trial mounting of an MG FF cannon in the forward part of a Ju 88A-4 gondola. (Photo: G. Heumann/Air Pictorial)

KG 60 (P1): A little-known unit which despite its *Geschwader* designation probably had an effective strength of only one *Gruppe*. Thought to have operated the Ju 88 in Scandinavia and the Mediterranean between October 1942 and the early spring of 1943.

KG 76 (F1): Flew the Ju 88A as part of *Luftflotte* II in the Battle of Britain. Saw service in Russia and Sicily, returning to France as part of the *Luftwaffe* build-up shortly after D-Day.

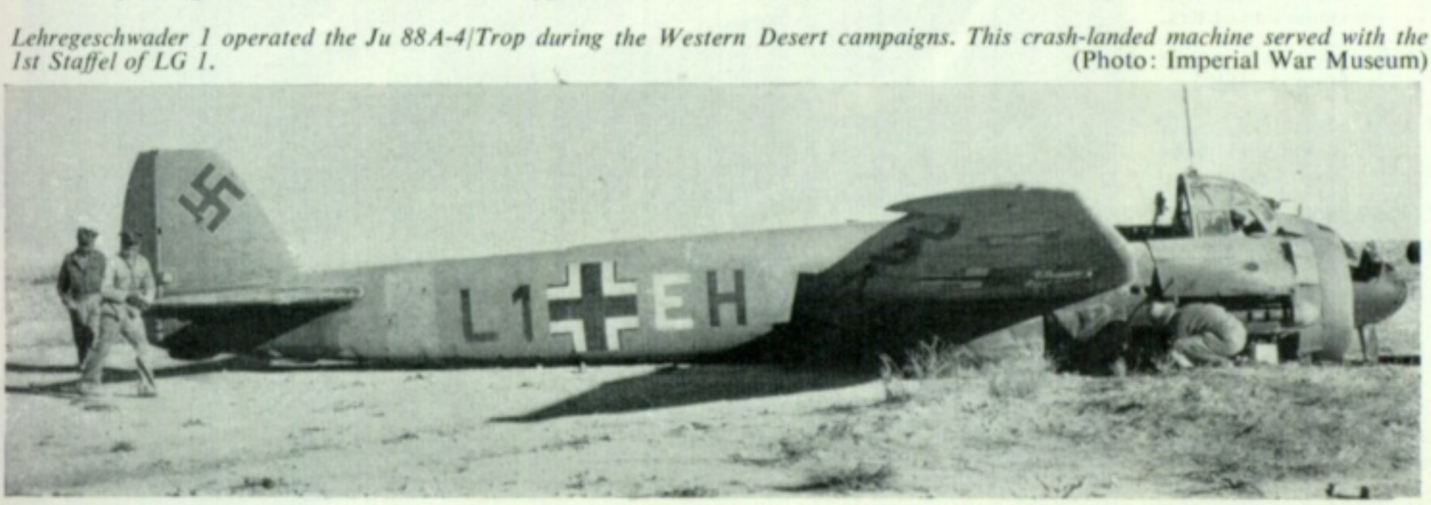
KG 77 (3Z): Equipped with the Ju 88A-5 in November/December 1940. Operated for a year in Russia until May/June 1942 when the unit was transferred to Sicily. Disbanded in Italy after the Axis defeats of mid-1943.

Lehregeschwader 1 (L1): Following there-organisation of this training *Geschwader* in the first winter of the war, LG 1 operated three *Gruppen* of Ju 88As. The unit saw service on all major fronts and remained an effective unit until 1945. It is best known for its operations in the North African campaign with the Ju 88A-4/Trop.

(The coastal strike units Ku.Fl.Gr.106 and Ku.Fl. Gr.506 were re-designated KGr 106 and KGr 506 in the spring of 1941. Coded M2 and S4 respectively, these units operated Ju 88A-4s and A-5s on mine-laying operations until the following summer, when they were disbanded. KGr 28, previously KGr 126, operated A-17s on torpedo strikes.)

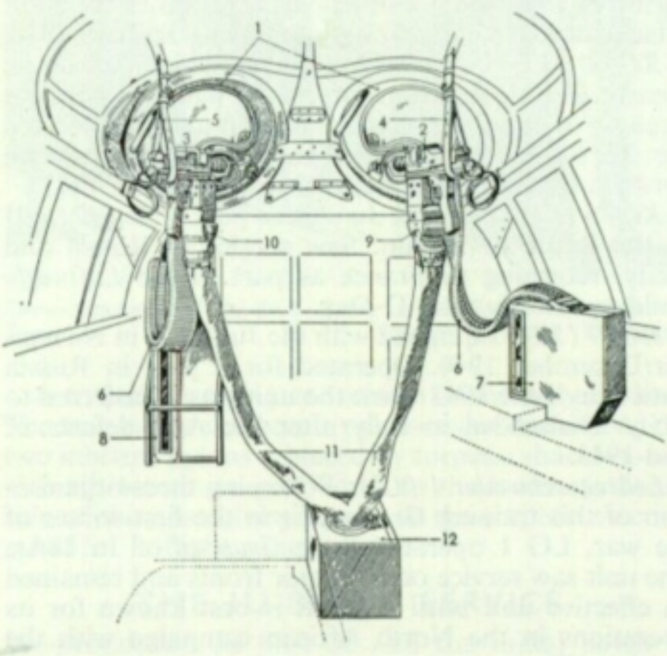
KGr 806 (M7): Took part in the Battle of Britain with the Ju 88A-1, and later saw service in Russia and the Middle East with the Ju 88A-4.

Lehregeschwader 1 operated the Ju 88A-4/Trop during the Western Desert campaigns. This crash-landed machine served with the 1st Staffel of LG 1. (Photo: Imperial War Museum)



Russian Navy personnel examine a Ju 88A-4 of KG 30 brought down by naval gunfire on the shores of the Barents Sea. (Photo: Imperial War Museum)

Ju 88A REAR ARMAMENT



LUFTWAFFE UNITS AND MARKINGS

The basic *Luftwaffe* tactical unit was the *Geschwader*. The bomber *Geschwader* (*Kampfgeschwader* or KG) consisted of three, four, or five *Gruppen*, each of which was in turn made up of three *Staffeln*. These sub-units were numbered independently; thus I/KG 76 (the first *Gruppe* of *Kampfgeschwader* 76) consisted of 1/KG 76 (the first *Staffel* of *Kampfgeschwader* 76), 2/KG 76 and 3/KG 76. Similarly, 7/KG 76, 8/KG 76 and 9/KG 76 made up the strength of III/KG 76.

The operational strengths of these formations varied greatly, but an average *Staffel* mustered between ten and sixteen aircraft, thus giving a *Geschwader* an establishment of some 110–150 machines.

Kampfgeschwader, *Stuka Geschwader*, *Nachtjagdgeschwader*, *Zerstörergeschwader*, *Transportgeschwader*, *Aufklärungsgruppen* (Reconnaissance Squadrons) and miscellaneous units used a four-symbol code on the fuselage sides of aircraft for identification purposes. A numerical/letter code appeared on the left-hand side of the national marking, identifying the *Geschwader*; e.g.,

1. Armour-glass gun mountings LLK 81 VE.

2 & 3. Left and right 7·9 mm. MG 81 J machine guns.

4 & 5. Left and right strap rear mountings.

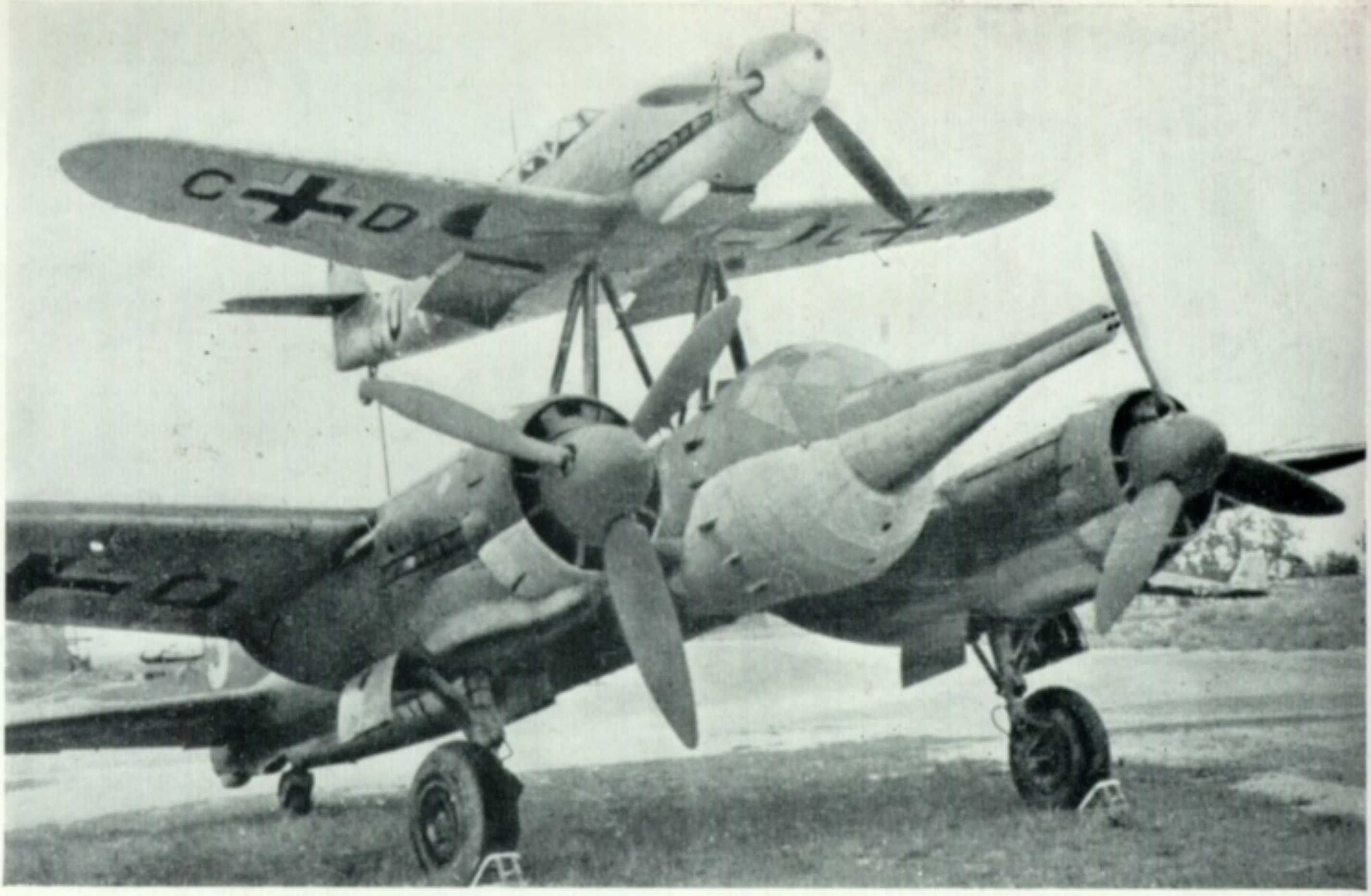
6. Flexible metal-link ammunition belts.

7 & 8. Ammunition belt storage lockers.

9 & 10. Left and right spent cartridge-case chutes.

11 & 12. Sleeve and box for collection of spent cartridge-cases.

A Ju 88A taxies out to take off with an external bomb load. (Photo: R. Ward Collection)



Converted Ju 88A-4s carried a 7,726-lb. hollow charge warhead as the lower component of the Great Beethoven/Mistel 2 composite weapon. The machine, illustrated here, was guided onto target by the Bf 109F mounted on the framework above the centre-section. Note the protruding detonators in the nose-probe.

4D=KG 30. From 1943 onwards this combination either appeared in very small characters or was omitted altogether. Sometimes it was reproduced in small characters on the vertical tail surfaces of bombers, and often temporary camouflage finishes were applied in such a way as to obscure it.

On the right of the national marking two letters appeared. The first, painted or outlined in the *Staffel* colour, or in green on staff aircraft, identified the individual aircraft. The second letter identified the *Staffel* within the *Geschwader*. Towards the end of the war, it increasingly became the practice for the individual marking only to be applied to the fuselage; and this was often repeated under the wingtips.

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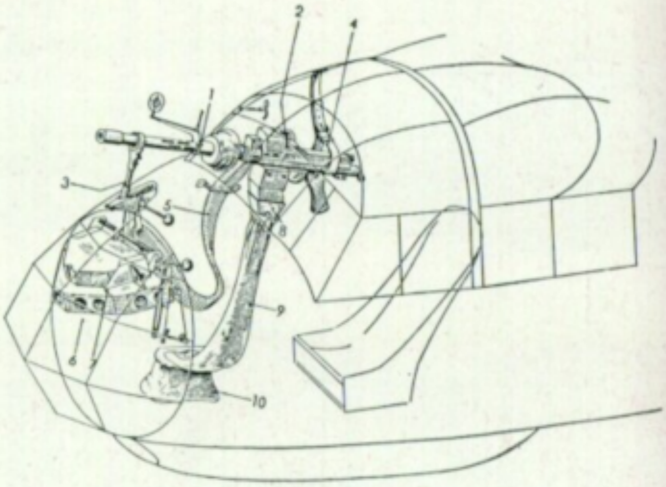
Ju 88A NOSE ARMAMENT



1. Lg 81 VE gun mounting.
2. MG 81 J machine gun (7·9 mm.).
3. Adjustable forward mount.
4. Strap rear mounting.
5. Flexible metal-link ammunition belt.

6 & 7. Ammunition belt storage locker.

8. Spent cartridge-case chute.

9 & 10. Spent cartridge-case collection bag.

Staff Aircraft Identification

These letters took the place of the fourth, or Staffel, symbol.

Geschwader Staff = A	III Gr. = D
I Gruppe = B	IV Gr. = E
II Gr. = C	V Gr. = F

STAFFEL IDENTIFICATION

Staffel Colour	I Gruppe	II Gruppe	III Gruppe	IV Gruppe	V Gruppe
White	1st Stfl. = H	4th Stfl. = M	7th Stfl. = R	10th Stfl. = U	13th Stfl. = X
Red	2nd Stfl. = K	5th Stfl. = N	8th Stfl. = S	11th Stfl. = V	14th Stfl. = Y
Yellow	3rd Stfl. = L	6th Stfl. = P	9th Stfl. = T	12th Stfl. = W	15th Stfl. = Z

Thus, machine B 3 + (White P) M was machine "P" of 4/KG 54.

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by George Falkner & Sons Ltd., for McCorquodale City Printing Division, London.